

DECISION-ANALYTIC MODELING IN PARKINSON'S DISEASE

Siebert U¹, Bornschein B², Walbert T³, Dodel R³

¹Harvard University, Boston, MA, USA; ²University of Munich, Munich, Germany; ³University of Bonn, Bonn, Germany

OBJECTIVES: To give a systematic overview on published decision-analytic studies and methodological approaches in the evaluation of therapies in Parkinson's disease (PD) and derive generic recommendations for future PD decision models. **METHODS:** A systematic literature review was performed to identify studies that evaluated interventions for PD using mathematical models. Using a standardized assessment form, information on methodological framework, results, limitations and conclusions were extracted from publications and reported in systematic evidence tables. The evidence on strengths and limitations was summarized in recommendations for further PD modeling. **RESULTS:** We identified 8 studies [1–8] that used mathematical models to evaluate the effect of different pharmaceutical and surgical treatment options in PD in different settings and countries. Modeling approaches comprised mathematical equations as well as decision-trees and Markov models with a time horizon ranging from 5 years to lifetime. All models based progression on the evolution of clinical surrogate endpoints and included economic consequences. No model is currently available that encompasses both the underlying biologic disease progression and the spectrum of all relevant complications, and in addition, links them to patient preferences as well as to economic outcomes. **CONCLUSIONS:** A generic and flexible decision model for PD, that can be applied to different treatment strategies should consider the entire spectrum of clinically relevant outcomes and complications during an adequately long time horizon and should be externally validated. Models for economic evaluations adopting a societal perspective should include patient preferences and all relevant economic consequences including those of adverse events. Evaluating early diagnosis in combination with neuroprotective therapies requires the use of health states that represent the natural history of the disease in untreated patients such as Hoehn & Yahr off stages or histologically defined health states.

ENSURING A STANDARD USER INTERFACE FOR MODELS: MODEL-IT

Caro JJ, Magno LL

Caro Research Institute, Concord, MA, USA

Cost-containment pressures worldwide are increasing the demand on drug developers to demonstrate the value of products in order to obtain reimbursement. To meet this demand, developers are turning to economic models. While models are informative tools, they can be expensive to produce, their complexity makes them difficult to

understand and the lack of standardized formatting makes them hard to navigate. **OBJECTIVE:** To develop a low cost tool that allows model results to be viewed in a standard format and to increase interdisciplinary access models in order to support wider use in the development and marketing of new pharmaceuticals. **METHODS:** An electronic viewer (MODEL-IT) was developed as a "container" to display and run analyses of disease models. Building on the widespread familiarity of Windows®, the tool was programmed to work as a stand-alone application in a Win2000, WinXT, or WinNT environment. Screens were developed to display inputs and outcomes pertinent to the model being analyzed, while maintaining a consistent format. Incorporation of point and click technology was used to simplify model functions by programming buttons to carry out specific tasks. **RESULTS:** The MODEL-IT tool breaks input parameters into specific categories including drug efficacy, population characteristics and country-specific costs. All fields are editable. Outcomes are model-specific and include costs, survival and cost-effectiveness. Model edits can be saved for later use, printed and exported to other programs. To allow users access to detailed model information, the technical manual can be accessed through a button control. **CONCLUSIONS:** Current trends in the increased use of pharmacoeconomic analysis will demand standardization of models to streamline efficiency and transfer expertise to multidisciplinary users. Standardized user interfaces will become increasingly important in meeting these needs.

THE USE OF A SEMI-MARKOV PROCESS MODEL IN COST-EFFECTIVENESS MODELING: THE CASE OF ANTI-EPILEPTIC DRUGS

Hawkins NS, Epstein D, Sculpher M

University of York, York, North Yorkshire, United Kingdom

OBJECTIVE: Markov models are often used as part of cost-effectiveness analysis to extrapolate from short-term experimental evidence. Most Markov models used in economic evaluation typically assume fixed transition probabilities with respect to time. This is because implementation of time-dependant probabilities for all states is difficult in widely used modeling software. This is a limiting assumption when transitions are clearly time dependent. In such circumstances, semi-Markov processes, with time-dependent probabilities, may be necessary to provide reliable estimates of cost-effectiveness. **METHODS:** The implementation of a semi-Markov process will be illustrated using a recent analysis of anti-epileptic drug sequences for the National Institute for Clinical Excellence. In this case study, the probability of treatment failure was dependant on the time spent on the current treatment. Although such models can be implemented in Excel or other modeling applications, the large number of states required makes this cumbersome. As an alternative, the model was realized using "R", a statistical

PMD31

PMD33

PMD32

programming language, using a 3-dimensional transition matrix, where the third dimension represents time spent in the current state. The ability of R to manipulate n-dimensional numeric arrays allowed the complex model to be easily implemented. **RESULTS:** The use of a semi-Markov process to model cost-effectiveness in epilepsy allowed the reported natural history of the condition to be accurately reflected. This was achieved efficiently and transparently using the R statistical programming language. Furthermore, the alternative (and commonly used) assumption of fixed transition probabilities with respect to time generated important differences in cost-effectiveness results compared to the semi-Markov process. **CONCLUSIONS:** Semi-Markov process models may be useful in modeling a wide range of treatment processes. By adding further dimensions to the transition matrix, the transition probabilities could be made dependant on other aspects of patients' history providing a useful alternative to discrete event simulation, where increased speed of execution will aid probabilistic modeling.

PMD34

ANALYTIC CHOICES IN ECONOMIC MODELS OF TREATMENTS FOR RHEUMATOID ARTHRITIS: WHAT MAKES A DIFFERENCE?

Barbieri M¹, Drummond MF¹, Wong J²

¹Innovus Research UK Ltd, High Wycombe, United Kingdom;

²New England Medical Center, Boston, MA, USA

OBJECTIVES: To compare the analytic judgements, data and assumptions of different models used in the economic evaluation of infliximab, one of a new class of drugs for rheumatoid arthritis (RA). The purpose was to understand why different models give such varying results. **METHODS:** A detailed assessment was made of three models, one submitted (in a reimbursement dossier) by the manufacturer, one produced by an independent academic group and one published in the literature. Factors considered included the key data inputs, assumptions about the sequencing of treatments for RA, the estimation of cost offsets and the modelling of the maintenance of treatment effect for patients continuing or discontinuing infliximab. **RESULTS:** Two of the models, although embodying different methodological approaches, gave fairly similar results (approximately £30,000–£40,000 cost per additional quality-adjusted life-year gained). The third model, by the independent academic group, gave much higher estimates, around £100,000 per QALY. The differences were mainly because of the assumptions about the positioning of infliximab in the treatment sequence and assumptions about the long-term effect of therapy. **CONCLUSIONS:** Economic models of treatments for rheumatoid arthritis incorporate several key analytic judgements, which can have major impacts on cost-effectiveness. Two of the three models examined gave similar results, which suggests that consensus can be reached on several of the main methodological issues.

PMD35

A METHODOLOGICAL APPROACH TO ASSESS COST DUE TO DYING IN THE CONTEXT OF DECISION ANALYTIC MODELLING

Aidelsburger P¹, Wasem J²

¹University of Greifswald, Greifswald, Germany; ²University Duisburg-Essen, Essen, Germany

OBJECTIVES: Decision analytic models relate health outcomes in a specific health state with the costs arisen in this health state. In most of the decision analytic models we will find the option that people will die either due to a specific disease or due to other unspecified causes. Treatment costs in the last two years before dying are exceptionally high. Applying the health state costs to a patient who is dying will underestimate the true costs. Additional costs should be applied to correct for this potential bias. This will present a methodological and pragmatical approach to estimate costs due to dying of a disease specific cause and unspecified causes. **METHODS:** Age-specific and non age-specific costs were calculated. Dying of unspecified causes revealed to the most common causes for dying reflecting a background mortality. To assess the disease specific costs of dying—in our case for hepatitis C virus associated diseases; relevant causes of dying have been identified. Principle of all cost calculations was the combination of length of terminal hospital stay multiplied by per diem costs. **RESULTS:** Over the age of 15 years costs of dying are similar for disease-specific causes and unspecified causes with a range between €2.133 and €3.701. In the age group between 0 and 4 years costs for unspecified causes are about €7.645, in the age group between 5 and 14 years costs are €8.011. Hepatitis C Virus associated costs for both age groups are €19.987, respectively €13.018. **CONCLUSIONS:** The described pragmatical approach just considers additional costs in consequence of the last inpatient treatment before death. Therefore costs are still underestimated. Main advantage of the described approach will be the applicability to different decision analytic models.

METHODOLOGICAL ISSUES—Other Studies

PMD36

ARE ISPOR SHORT COURSES A COST-EFFECTIVE WAY OF EDUCATING PARTICIPANTS AND ENHANCING MEETING ATTENDANCE?

Basskin LE¹, Augustyniak L²

¹Trinka Medical Publications, Cooper City, FL, USA; ²ISPOR, Lawrenceville, NJ, USA

OBJECTIVES: The purpose of this study was to determine whether short courses offered by ISPOR at its Annual Meeting are a cost-effective means of education and enhancing meeting attendance, or if the type, complexity, number, or duration of the courses should be changed. **METHOD:** Four different survey techniques